Organics Recycling: A Status Report

When we say *organics recycling*, we are referring to all solid waste management activities that collect, process, and use organic-derived materials. BY MARC J. ROGOFF, PH.D., GREG MCCARRON, P.E., AND BRUCE CLARK, P.E.

While organic materials (foodwaste and yardwaste) represent roughly about a quarter of the typical municipal solid wastestream, many of these materials have, up until recently, been disposed in landfills and waste-to-energy facilities. In recent years, many solid waste agencies and waste generators have looked to these organics as a feedstock for biogas-generating facilities or composting plants. Governmental regulations and technologies for organics have also been rapidly evolving. Many cities across North America are developing a variety of organics diversion programs. This paper will appear as a two-part series: the first briefly reviews some of the major facets of this trend; the second, to be published later this year, will present a more comprehensive overview of this rapidly emerging topic.

Regulations and Policy

In recent years, many states have enacted legislation and regulation to promote organics diversion from solid waste disposal facilities. Some of the more prominent efforts are described in the paragraphs below.

California—CalRecycle is currently operating under strategic directives adopted in February 2007, and revised in March and June 2009. Under its Strategic Directive 6.1, CalRecycle seeks to reduce by 50% the amount of organic waste disposed in the state's landfills by 2020. This directive also encompasses one of CalRecycle's actions to help California reduce its generation of greenhouse gases under the state's Climate Change Scoping Plan.

The development of anaerobic digestion (AD) facilities is one of CalRecycle's charges under the Plan. CalRecycle intends to adopt the AD Initiative, a comprehensive program to foster the development of AD facilities to convert organic solid wastes into sources of energy, valuable compost feedstocks, soil amendments, and other products.

California is also revising its existing solid waste regulations regarding compostable materials, transfer/processing, permit application form, and permit exemptions.

Connecticut—On June 30, 2011, the state of Connecticut enacted PA 11-217, which requires certain commercial entities that generate an average of at least 104 tons of source-separated organic (SSO) materials a year to separate and compost foodwaste, if a permitted SSO material composting facility is not more than 20 miles from such generators. The law took effect October 1, 2011. or not later than six months after the establishment of service in the state by two or more permitted SSO material composting facilities. As of this past summer, there was only one permitted SSO facility in operation in the state.

Illinois—Commercial composting sites are regulated like a landscape waste compost facility, rather than a pollution control facility. Commercial compost sites are still subject to setback requirements (regulating distance from schools and hospitals) and requirements concerning odor and nuisance control.

Massachusetts—The Draft 2010-2020 Massachusetts Solid Waste Master Plan (Plan) proposed ambitious goals of reducing the quantity of waste disposed in the Commonwealth by 30% (2 million tons) by 2020. A major proposed priority is to significantly increase the diversion of organic material from the solid wastestream, from the 100,000 tons that were diverted in 2009 to 450,000 tons by 2020, an increase of 350,000 tons per year. Meeting this goal will require significant increases in in-state capacity at aerobic digestion, anaerobic digestion, composting, and recycling facilities.

As such, MassDEP amended the Massachusetts Site Assignment Regulations (310 CMR 16.00) and the Solid Waste Management Facility Regulations (310 CMR 19.000), with an effective date of November 23, 2012. Depending on the type and size of a facility that is handling only source-separated organic material, it would be

- exempt from MassDEP site assignment and solid waste regulations; or
- operating under a "general permit"; or
- operating with a facility-specific Recycling/Composting/Conversion Permit from MassDEP (this permit program would replace the "determination of need" process).

Under a general permit, operations or activities that meet specific criteria can be built and operated without a site-specific permit from MassDEP, as long as they meet the conditions established in the regulation. Two groups of operations would be eligible for a general permit:

- Composting operations, with a maximum capacity of 50,000 cubic yards of organic material onsite at any time. The composting operations would be limited to accepting 105 tons of putrescible materials per week.
- Aerobic or anaerobic digestion facilities that accept up to 100 tons per day of source-separated organic material that is pumped directly into the digester unit or a sealed storage tank.

MassDEP is also expected to add commercial organic material to its "waste ban" regulations, with an effective date of summer 2014. Waste bans are prohibitions on the disposal, transfer for disposal, or contract for disposal

of certain hazardous and recyclable items at solid waste facilities in Massachusetts. "Commercial Organic Material" is expected to be defined as food material and vegetative material from any commercial or institutional entity, public or private, that generates more than one ton of that material per week, but excluding material from residences.

Ohio—The Ohio Environmental Protection Agency modified its composting rules in order to encourage more food composting, improve performance and effectiveness at composting facilities, and allow the use of wood as a bulking agent. New Administrative Code chapter 3745-560, Composting Facilities, became effective April 2, 2012.

Oregon—In December 2012, Oregon adopted a document entitled, "2050 Vision for Materials Management in Oregon." One policy is to develop a strategy to increase recovery of foodwaste and yardwaste and to limit them from entering the disposal stream of wastes destined for landfill or incineration. The state will consider the use of incentives to increase recovery such as consideration of mandates for food scrap collection in areas with composting or anaerobic digester capacity at a reasonable price. In consultation with local governments and other partners, the state may ban food scraps from entering the disposal stream (destined for landfill or incineration) by 2025.

DEQ has formed an advisory committee to provide input for creating rules covering conversion technologies facilities. Conversion technologies consist of a variety of biological, chemical, and thermal (excluding incineration) processes that convert solid waste into chemicals, fuels, and other products. Examples of conversion technologies include anaerobic digestion.

Vermont—With an effective date of July 1, 2012, Vermont passed Act 148, which calls for all residents to recycle or compost foodwaste by 2020 and prohibits the disposal of recyclable and compostable materials in landfills. The Vermont law begins phasing-in with large foodwaste generators in 2014. By instituting phased-in bans on certain materials (recyclables, leaf and yard residuals, and food residuals) and by requiring parallel collection (requiring collection of these materials at the same location where trash is collected), more of these materials can be diverted from disposal. The bans and mandates will be phased in over the next eight years.

The requirement to separate food residuals is only triggered when a generator exceeds a specified threshold amount and the generator is located within 20 miles of a certified organics management facility that has capacity and will accept the residuals. By July 1, 2020, any person generating any amount of food residuals will be required to manage the residuals onsite or arrange for their transfer.

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Municipal Programs

San Francisco—The most prominent local organics collection program is in San Francisco, where homes have three bins: green for compostable, blue for recyclables, and black for the rest. This program has catapulted San Francisco to a reported nation-leading 78% diversion rate, with the city planning to become the first North American City to achieve "zero waste" status by 2020.

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The city's system, called "The Fantastic Three," which is run by Recology, was founded as a mandatory program after a series of pilot programs had shown that food scraps, yard trimmings, coffee cups, pizza boxes, and milk and juice cartons could be broken down at Jepson Prairie Organics, which is located about 55 miles east of the city in Vacaville, CA. Here, the organic wastestream is converted into a product useful for the nearby farming community.

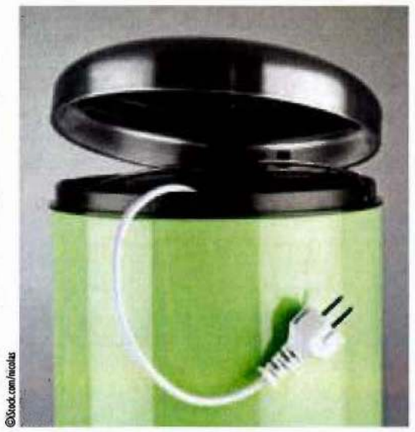
The city's series of pilot programs, started in the late 1990s, tested a variety of important collection issues such as the type of organic material collected, bin size and configuration, type of vehicles used, and collection frequency. This experience prompted the city to decide to collect all three waste categories weekly on the same day, using side-loading, single- and dual-compartment, semiautomatic compacting vehicles. This configuration allows the dual-compartment truck to be operated by a single employee and serve roughly 1,800 to 2,000 customers per week with the dual-compartment truck, and about 6,000 customers per week with the single-compartment truck.

To accomplish its overall goals of organics diversion, the city has developed an extensive outreach program to inform its customers in several different languages. Using a pay-as-you-throw system, residents are provided economic incentives to recycle based on the volume of their black cart.

Toronto—Due to increasing costs to dispose of its waste as far as Michigan, the city of Toronto began work on a "made in Toronto" solution for waste diversion. Similar to San Francisco, Toronto has implemented its "Green Bin Program" that included the establishment of a full-scale curbside organics collection program for roughly 510,000 single-family households. Over nearly 10 years, the city has built upon a series of pilot programs to understand

the levels of participation and anticipated recovery rates. The program is now being rolled out to multifamily buildings (apartments, condos, and co-ops) receiving city collection since nearly 40% of the city's residents live in apartments.

Toronto carefully planned the logistics of its collection program. Currently, the city uses split-compaction trucks operated by franchise haulers that pick up organics on a weekly basis, at the same time using the other compartment to collect either refuse or single-stream recyclables.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Residents are provided with a 16-gallon container for the kitchen and a 16-gallon wheeled cart to place out at the curb. As designed, the program collects almost all organic materials including food and vegetable scraps, meat, fish, and dairy products, pasta, bread, cereal, coffee grounds and filters, paper food packaging, diapers, sanitary products, household plants, and animal waste. Yardwaste is collected separately, depending on the season.

Toronto uses a state-of-the-art anaerobic digester facility, which was designed to remove plastics (bags) and handle diapers. A second plant is under construction with agreements set in place with private providers who are expanding and improving their systems. Methane gas produced by these two facilities is converted into energy.

To most observers, Toronto's Green Bin Program is considered to be very successful. Recent statistics suggest that over 90% of Toronto's single-family residents are participating at a rate of 10 pounds per week with the city capturing an estimated 72% of organics in the municipal wastestream for these units.

Technologies

Given the interest in organics recycling, many technology vendors have emerged with several new projects in operation in North America over the last several years.

Harvest Power Richmond—Harvest Power owns and operates the largest permitted food and yardwaste processing facility, located just outside the city of Vancouver, BC. The company has partnered with Metro Vancouver, which has implemented a residential food scraps program, as part of its efforts to reduce, reuse, and recycle 70% of the region's municipal solid waste.

Under this program, Metro collects uncooked fruit and vegetable scraps, coffee grounds and filters, teabags, and eggshells on a biweekly schedule and disposes of these materials at transfer stations where they are weighed and charged a tipping fee of $63 per metric ton, significantly less than the current Metro rate for normal solid waste at $107 per metric ton.

These organic materials are then transported to the company's aerobic, static pile facility, where the materials are composted and then cured and screened to produce a high-quality soil amendment. The company has plans to build an anaerobic digestion plant to process the wetter and higher-calorie foodwastes from restaurants and multifamily units as Metro expands its foodwaste collection program.

University of Wisconsin–Oshkosh—As part of its climate action plan, the University of Wisconsin-Oshkosh aggressively planned to reduce carbon emissions through both energy efficiency and renewable power generation. Emerging from this plan was construction in 2011 of an anaerobic digester and a combined heat and power conversion unit near the main campus. While most anaerobic digesters process "wet" materials, the facility is the nation's first commercial-scale "dry" biodigester, meaning that the plant takes in source-separated organics in solid form. The digester takes in roughly 8,000 tons of food and yardwaste annually; some of this feedstock comes from the campus, but the bulk is supermarket produce and yardwaste collected by the city of Oshkosh. The source-separated organics are processed to yield biogas and biosolids that are similar to late-stage compost. The solid materials are sold within the state as fertilizer, and the biogas is used to maintain constant temperatures throughout the digester process and to produce electricity, which is sold back to the grid.

As of last summer, the facility was operating at 50% capacity. When fully operational, it will be able to provide up to 10% of the campus's electricity and heat. The facility is also being operated as a learning lab for campus students.

Ineos-Bio—The federal government has promoted the use of alternative waste conversion technology through stimulus funding and loan guarantees. The most prominent of these pilot projects is being implemented by Ineos-Bio at its newly constructed facility located in Vero Beach, FL. This facility is designed to utilize yardwaste, vegetative waste, and agricultural waste to produce upwards of 30 million gallons of ethanol and 6 MW of electrical power per year at full production. Under the Ineos-Bio technology, these feedstock materials are designed to pass through a gasification process to produce synthesis gas, or *syngas*. The heat recovered from the hot syngas is fed into a steam turbine and is used to generate renewable electricity. The renewable electricity powers the center and the excess electricity is expected to power as many as 1,400 homes in the Vero Beach community. The plant is currently in pilot testing with the ethanol anticipated in the fourth quarter of 2012.

Peninsula Compost Group—The Wilmington Organics Recycling Center (WORC) is a large-scale commercial foodwaste and yardwaste composting facility located on 27 acres in Wilmington, DE. The location was formerly a brownfield site that was remediated prior to construction. The project was developed by The Peninsula Compost Group over a three-year period at a cost of $20 million. Ground was broken in May 2009, and construction was complete in December 2009.

The WORC accepts foodwaste and leaf waste, up to 550 tons per day. The WORC uses the Gore Cover System, which entails outdoor, aerated static pile composting and use of a Gore cover for part of the process. **MSW**

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